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Redesignation Demonstration and Maintenance Plan for the Illinois Portion of the St. Louis Nonattainment Area for the 1997 Annual Fine Particulate Matter ($PM_{2.5}$) National Ambient Air Quality Standard

AQPSTR 18-04

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AIM	Architectural and Industrial Maintenance
AQS	Air Quality System
BACT	Best Available Control Technology
BOF	Basic Oxygen Furnace
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CFR	Code of Federal Regulations
CMAQ	Congestion Mitigation and Air Quality
CPS	Combined Pollutant Standard
CSAPR	Cross-State Air Pollution Rule
DERA	Diesel Emissions Reduction Act
DNR	Department of Natural Resources
EGAS	Economic and Growth Analysis System
EPA	Environmental Protection Agency
FEM	Federal Equivalent Method
GVWR	Gross Vehicle Weight Rating
I/M	Inspection/Maintenance
IPCB	Illinois Pollution Control Board
IDOT	Illinois Department of Transportation
lb	Pounds
MACT	Maximum Achievable Control Technology
MATS	Mercury and Air Toxics Standards
mmBtu	Million British Thermal Units (Btu)
MOVES	Motor Vehicle Emission Simulator
mph	Miles Per hour
MPS	Multi-Pollutant Standard
NAAQS	National Ambient Air Quality Standard
NESHAP	National Emission Standards for Hazardous Air Pollutants
NH3	Ammonia
NODA	Notice of Data Availability
NOx	Oxides of Nitrogen
NSPS	New Source Performance Standards
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter less than 2.5 microns in diameter
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
RACM	Reasonably Available Control Methods
RACT	Reasonably Available Control Technology
RFG	Reformulated Gasoline
RFP	Reasonable Further Progress
RVP	Reid Vapor Pressure
SIP	State Implementation Plan
SO_2	Sulfur Dioxide

TEOMS	Tapered Element Oscillating Microbalance
TIP	Transportation Improvement Program
USC	United States Code
USEPA	United States Environmental Protection Agency
$\mu g/m^3$	micrograms per cubic meter
VMT	Vehicle Miles Traveled
VOM	Volatile Organic Material

Executive Summary

This document presents Illinois' redesignation demonstration and maintenance plan for particulate matter less than 2.5 microns in aerodynamic diameter ($PM_{2.5}$) for Madison County, Monroe County, St. Clair County, and Baldwin Township in Randolph County in the bi-state St. Louis nonattainment area under the 1997 annual $PM_{2.5}$ NAAQS. A maintenance plan is required before the area can be redesignated from nonattainment to attainment of the 1997 annual $PM_{2.5}$ NAAQS. This document provides the technical information required to support a redesignation request, which Illinois is submitting in conjunction with the maintenance plan to the U.S. Environmental Protection Agency (USEPA).

Since the January 2005 $PM_{2.5}$ nonattainment designation for the bi-state St. Louis area, ambient air quality monitoring data has shown attainment of the NAAQS commencing with the three-year period from 2007-2009 and continuing to the present. On May 23, 2011, USEPA published a "clean data determination" for the St. Louis $PM_{2.5}$ nonattainment area indicating attainment with the 1997 annual $PM_{2.5}$ NAAQS. $PM_{2.5}$ air quality has improved due to permanent and enforceable emission control measures that have been implemented by the State of Illinois, State of Missouri, and the federal government. The proposed maintenance plan provides for continued attainment of the $PM_{2.5}$ NAAQS for a period of at least ten years after USEPA has redesignated the area to attainment. The maintenance plan provides assurances that, even if there is a subsequent violation of the NAAQS, contingency measures will be triggered that will prevent any future occurrences.

The Illinois EPA is requesting that USEPA redesignate the Illinois portion of the nonattainment area to attainment pursuant to the provisions of Clean Air Act (CAA), Section 107, and that it approve the associated maintenance plan as a SIP revision fulfilling the requirements of CAA Section 175A. Concurrent approval is requested for the inventory requirements and motor vehicle emissions budget requirements under CAA Section 172(c)(3) and Section 176(c), respectively.

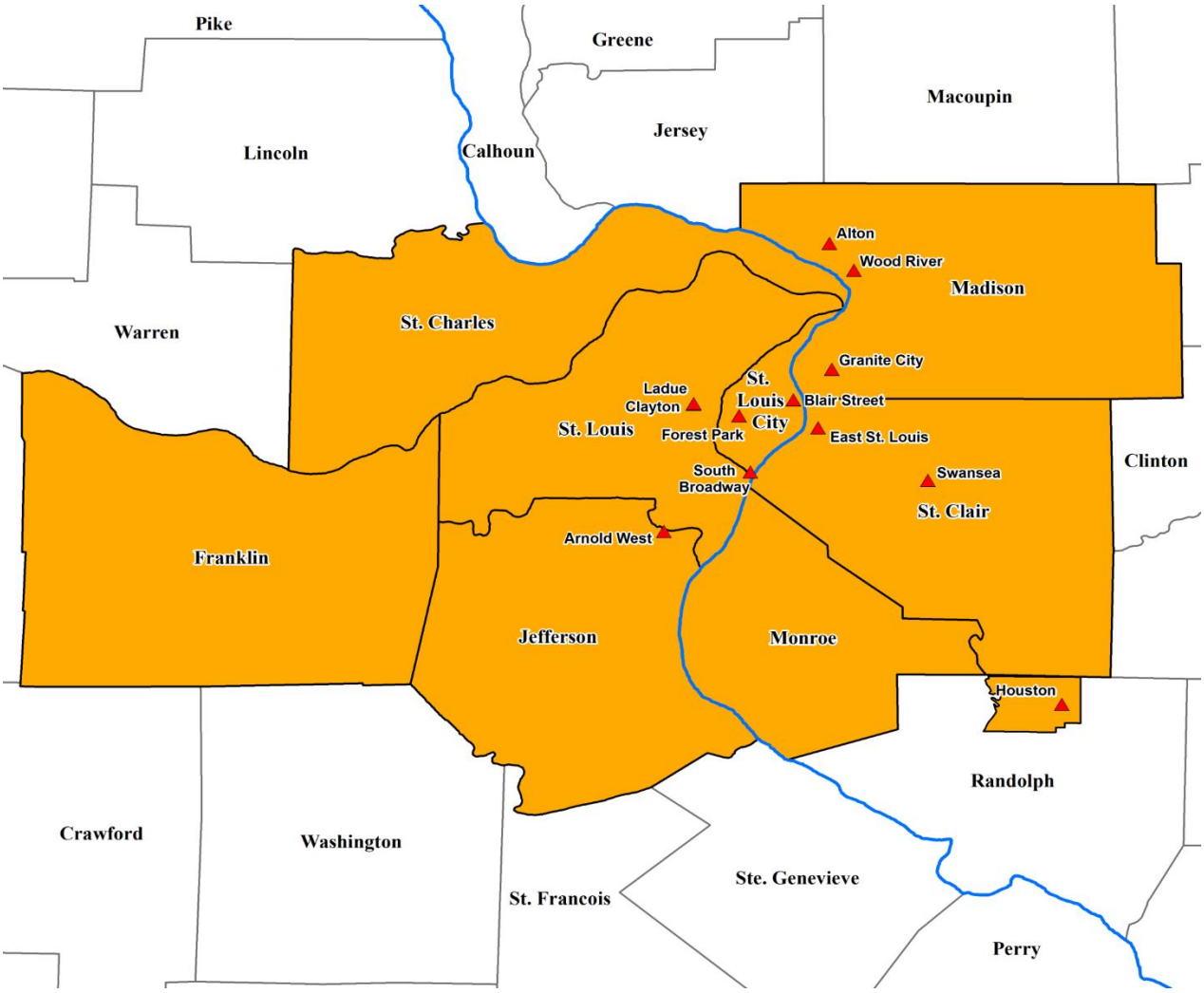
1.0 Introduction

The Illinois EPA has prepared this document to provide USEPA with the technical information needed to support a request to redesignate the area to attainment. This includes a redesignation demonstration and a maintenance plan for the Illinois portion of the 1997 $PM_{2.5}$ St. Louis nonattainment area. Illinois' maintenance plan for Madison, Monroe, and St. Clair Counties, and Baldwin Township in Randolph County, provides for continued attainment of the NAAQS following redesignation.

1.1 Regulatory Background

USEPA established the NAAQS for particulate matter less than 2.5 microns in aerodynamic diameter on July 18, 1997 (*Federal Register*, Vol. 62, No. 138, pp. 38652-38760). In that action, USEPA created an annual $PM_{2.5}$ NAAQS at a level of 15 micrograms per cubic meter ($\mu g/m^3$), based on the three-year average of annual arithmetic mean $PM_{2.5}$ concentrations, and a 24-hour $PM_{2.5}$ NAAQS at a level of 65 $\mu g/m^3$ based on the three-year average of the 98^{th} percentile of 24-hour $PM_{2.5}$ concentrations. This rulemaking, together with a companion rulemaking (*Federal Register*, Vol. 62, No. 138, pp. 38764-38854), specified operational and technical requirements in implementing ambient air sampling for the $PM_{2.5}$ NAAQS. On the basis of certified, quality-assured air monitoring data obtained for calendar years 2001-2003, USEPA designated the Illinois counties of Madison, Monroe, and St. Clair, together with Baldwin Township in Randolph County, and the Missouri counties of Jefferson, Franklin, St. Charles, and St. Louis, together with the City of St. Louis, as a bi-state nonattainment area for the 1997 annual $PM_{2.5}$ standard (*Federal Register*, Vol. 70, No. 3, January 5, 2005; *Federal Register*, Vol. 70, No. 71, April 14, 2005). The bi-state St. Louis area was designated unclassifiable/attainment for the 24-hour $PM_{2.5}$ standard that was also promulgated in 1997, and revised in 2006. Since the St. Louis area is not a nonattainment area for the 24-hour $PM_{2.5}$ NAAQS, any reference to the $PM_{2.5}$ NAAQS in the remainder of this document is specific to the annual $PM_{2.5}$ standard promulgated in 1997. The 1997 $PM_{2.5}$ nonattainment area for the St. Louis region, and the network of $PM_{2.5}$ monitors sited within the bi-state area, are shown in Figure 1.

Figure 1: $PM_{2.5}$ Nonattainment Area and NAAQS Monitoring Sites



1.2 Status of Air Quality

With steadily improving air quality following the nonattainment designation, the Illinois portion of the bi-state nonattainment area met the $PM_{2.5}$ annual air quality standard in 2010 (based upon 2007-2009 design values). On May 23, 2011, USEPA published a "determination of attainment" (*Federal Register*, Vol. 76, No. 99, pp. 29652-29656), otherwise known as a clean data determination, for the St. Louis $PM_{2.5}$ nonattainment area indicating attainment with the 1997 annual $PM_{2.5}$ NAAQS. The effect of this action was to suspend Illinois' obligation to submit an "attainment demonstration, associated reasonably available control measures (RACM), including reasonably available control technology (RACT), a reasonable further progress plan, contingency measures, and other planning State Implementation Plan (SIP) revisions related to attainment of the 1997 annual $PM_{2.5}$ NAAQS." In subsequent action, USEPA published its determination that the bi-state nonattainment area had attained the 1997 annual $PM_{2.5}$ NAAQS by the "applicable

attainment date of April 5, 2010," as determined from "quality-assured and certified monitoring data for the 2007-2009 monitoring period" (*Federal Register*, Vol. 77, No. 124, pp. 38183-38185, June 27, 2012). Though certain planning requirements were suspended because of monitored attainment, the requirement for submitting an approvable maintenance plan before the area can be redesignated from nonattainment to attainment was still statutorily required. The most recent three-year period for which complete, quality assured ambient air quality monitoring data is available in the area (2015-2017) demonstrates continued attainment of the 1997 annual $PM_{2.5}$ standard, and thus qualifies the area for redesignation to attainment. These data, accompanied by decreases in emission levels discussed later in this document, justify redesignation to attainment for the area based on CAA Section 107(d)(3)(E). Further information regarding the $PM_{2.5}$ air monitoring network and air quality monitoring data obtained from that network are provided in Section 3.0.

2.0 Redesignation and Maintenance Plan Requirements

CAA Section 107(d)(3)(E) establishes specific conditions that must be met before an area can be redesignated. The full text is as follows: "The Administrator may not promulgate a redesignation of a nonattainment area (or portion thereof) to attainment unless

(i) the Administrator determines that the area has attained the national ambient air quality standard;
(ii) the Administrator has fully approved the applicable implementation plan for the area under section 110(k);
(iii) the Administrator determines that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan and applicable Federal air pollutant control regulations and other permanent and enforceable reductions;
(iv) the Administrator has fully approved a maintenance plan for the area as meeting the requirements of section 175A; and
(v) the State containing such area has met all requirements applicable to the area under section 110 and part D."

This document addresses each of these requirements and provides additional information to support continued compliance with the $PM_{2.5}$ standard. The redesignation request and the maintenance plan are submitted concurrently, since, as noted in the September 4, 1992, USEPA guidance memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment*, "A State may submit both the redesignation request and the maintenance plan at the same time and," thus, "rulemaking on both may proceed on a parallel track."

The CAA requirement in Section 107(d)(3)(E)(i) is met when the design value, which is based on the average of three consecutive years' annual arithmetic means, is less than or equal to the level of the NAAQS (15.0 $\mu g/m^3$). The monitoring data must be quality assured in accordance with 40 CFR 58.10, recorded in USEPA's Air Quality System database, and made available to the public. As noted previously, USEPA published a final clean data determination for the bi-state St. Louis nonattainment area on May 23, 2011, and on June 27, 2012, published a final determination that the area had met the attainment date of April 5, 2010. Section 3.0 of this

document provides a detailed discussion of the quality-assured, ambient air monitoring data which form the basis of USEPA's findings.

The CAA redesignation requirement in Section 107(d)(3)(E)(ii) specifies that the SIP for the area, under Section 110(k), has been fully approved by USEPA. USEPA's May 23, 2011, "determination of attainment" suspended Illinois' obligation to submit certain SIP elements, including a modeling attainment demonstration. As such, these SIP elements are not required. On November 27, 2009, USEPA published final action (*Federal Register*, Vol. 74, No. 227, pp. 62251-62255) indicating a finding of failure to submit a SIP by April 5, 2008, to satisfy CAA requirements for attaining the 1997 $PM_{2.5}$ NAAQS. The single outstanding SIP requirement is a "comprehensive, accurate, current inventory of actual emissions from all sources of the relevant pollutant… in such area" (CAA, Section 172(c)(3)). This document provides the required inventory, thereby fulfilling Illinois' obligation to meet SIP requirements prior to USEPA approval and area redesignation.

The CAA requirement in Section 107(d)(3)(E)(iii) involves a determination by USEPA "that the improvement in air quality is due to permanent and enforceable reductions in emissions" from the state's SIP, from federal regulations, and/or from other means. Therefore, USEPA must determine that the improvement in air quality between the year violations occurred and the attainment year is attributable to permanent and enforceable emission reductions. Following promulgation of the January 5, 2005, nonattainment designation, and prior to attaining the $PM_{2.5}$ annual air quality standard in 2010 (based upon the 2007-2009 design values), certain federal regulations were further phased in or fully implemented, resulting in reduced primary $PM_{2.5}$ and/or $PM_{2.5}$ precursor emissions. Among those regulations impacting fuels and engines were the following: 1) On-highway heavy-duty engine and vehicle standards and highway diesel fuel sulfur control requirements (*Federal Register*, Vol. 66, No. 12, pp. 5002-5193, January 18, 2001); 2) Emission standards for nonroad diesel engines and sulfur reductions in nonroad diesel fuel (*Federal Register*, Vol. 69, No. 124, pp. 38957-39273, June 29, 2004); and 3) Extension of the reformulated gasoline program to the Illinois portion of the St. Louis ozone nonattainment area (*Federal Register*, Vol. 72, No. 78, pp. 20237-20242, April 24, 2007). Other federal rulemakings (NOx SIP Call, Tier 2 Vehicle Standards, Clean Air Interstate Rule – Phase I, etc.), federal consent decrees, and state rulemakings (Illinois Multi-Pollutant Standard, Illinois Combined Pollutant Standard, Enhanced Vehicle Inspection Program, etc.) have also contributed to reduced fine particle and precursor emissions. The control measures and emission reductions resulting from these rulemakings continue to be permanent and enforceable. Section 4 of this document presents a more expanded discussion of federal rulemakings, consent decrees, and state actions that have resulted in emission reductions.

Fulfillment of the CAA redesignation requirement specified in Section 107(d)(3)(E)(iv) is contingent upon USEPA approval of the maintenance plan required under CAA Section 175A(a). The full text of CAA Section 175A(a) is as follows: "PLAN REVISION. – Each State which submits a request under section 107(d) for redesignation of a nonattainment area for any air pollutant as an area which has attained the national primary ambient air quality standard for that air pollutant shall also submit a revision of the applicable State implementation plan to provide for the maintenance of the national primary ambient air quality standard for such air pollutant in the area concerned for at least 10 years after the redesignation. The plan shall contain

such additional measures, if any, as may be necessary to ensure such maintenance." The Illinois maintenance plan, prepared in accordance with the requirements specified in USEPA's guidance documents, will provide for continued attainment after the area has been formally redesignated.

Lastly, CAA Section 107(d)(3)(E)(v) conditions a redesignation approval upon the State meeting "all requirements" applicable to the nonattainment area "under Section 110 and Part D." Section 110 specifies that "Each State shall… adopt and submit to the Administrator… a plan which provides for implementation, maintenance, and enforcement" of the primary and secondary ambient air quality standards. Among its many other provisions, are the requirements for the "establishment and operation of appropriate devices, methods, systems, and procedures necessary to… monitor, compile, and analyze data…" and adequate authority and resources to carry out the implementation plan.

Part D provides general requirements for areas designated nonattainment, including those (e.g. RACM, RFP, current actual emissions inventory, etc.) for inclusion in nonattainment plan submittals. Certain requirements under Part D are suspended when a nonattainment area achieves the NAAQS because these requirements are correlated to attaining the NAAQS. Other requirements under Part D remain applicable because they are not directly related to attainment of the NAAQS. These include Section 172(c)(3) (Emissions Inventory) and Section 172(c)(5) (Permitting Requirements). The emissions inventory requirement is the sole outstanding Part D requirement, and it is fully addressed by this submittal.

To assist regulatory authorities in preparing redesignation demonstrations, USEPA issued the detailed guidance memorandum previously mentioned. One of the requirements specified in that guidance is the development of a maintenance plan, which is intended to ensure continued attainment of the $PM_{2.5}$ NAAQS in future years. In accordance with CAA Section 110(a)(2), the Illinois EPA is required to have a public comment period and provide the opportunity for a public hearing on the Maintenance Plan prior to adoption. As indicated in the guidance memorandum, a maintenance plan must contain the following elements:

1) *A comprehensive attainment emissions inventory of primary $PM_{2.5}$ and the precursors of secondary $PM_{2.5}$: ammonia (NH_3), oxides of nitrogen (NOx), sulfur dioxide (SO_2), and volatile organic material (VOM).* The Illinois EPA has developed a comprehensive emission inventory for the Metro-East St. Louis $PM_{2.5}$ nonattainment area which includes the emissions from the following source categories: point sources, area sources, on-road mobile sources, and off-road mobile sources for the year 2008.
2) *Projecting the attainment emissions inventory forward for a period of 10 years following the redesignation, and a demonstration that the projected level of emissions is sufficient to maintain attainment of the 1997 annual $PM_{2.5}$ NAAQS.* The Illinois EPA has developed an emission inventory for the projection year of 2030 using growth and control factors that are consistent with federal recommendations. The projected emission levels are significantly below the 2008 attainment year levels.

3) *A commitment that, once redesignated, the state will continue to operate an appropriate air quality monitoring network to verify maintenance of the attainment status.* The Illinois EPA is committed to continue monitoring $PM_{2.5}$ concentrations in the Metro-East St. Louis nonattainment area in accordance with 40 CFR Part 58 and USEPA-approved Annual Monitoring Plans. Illinois EPA will continue to quality assure the data and submit it into USEPA's AQS database in a timely fashion.
4) *A demonstration of legal authority to implement and enforce all control measures contained in the SIP.* The Illinois EPA has the legal authority to develop, implement, and enforce regulations regarding air pollution including the requirements of this SIP submittal under Public Act 76-2429 ("Environmental Protection Act"); 415 ILCS 5/4.
5) *Provisions for future updates of the inventory to enable tracking the progress of the maintenance demonstration through emissions levels.* The Illinois EPA is committed to providing future updates of the inventory during the 10-year maintenance period. A projected "interim year" 2025 emission inventory is included with this submittal. Illinois Pollution Control Board regulations found at 35 Illinois Administrative Code 254 require facilities with air pollution operating permits to annually report their emissions to the Agency. In addition, the Illinois EPA develops a comprehensive emissions inventory of point, area, and mobile sources every three years, in compliance with federal rulemaking (*Federal Register*, Vol. 73, No. 243, pp. 76539-76558, December 17, 2008).
6) *Motor vehicle emissions budgets for transportation conformity for the 10-year maintenance period.* The Illinois EPA has developed motor vehicle emissions budgets that will be used in transportation conformity determinations in the St. Louis metropolitan area through 2030.
7) *A commitment to submit a revised maintenance plan eight years after redesignation.* Under CAA Section 175A, an area designated as maintenance is required to submit a second maintenance plan eight years after redesignation under CAA Section 107(d). This second maintenance plan is intended to maintain the NAAQS for 10 years after the expiration of the initial 10-year period. The Illinois EPA recognizes the importance of a current maintenance plan, and commits to updating it as necessary.
8) *A list of potential contingency measures and a commitment to enact and implement these measures expeditiously, if future violations of the NAAQS occur.* The Illinois EPA is committed to maintaining compliance with the 1997 annual $PM_{2.5}$ standard. If future violations of the standard take place, the Illinois EPA will enact contingency measures no later than 18 months after USEPA's AQS indicates a violation has occurred. This will allow for the area to come back into compliance with the standard as quickly as feasible.

Illinois' Maintenance Plan has been prepared in accordance with the requirements specified in USEPA's guidance document, and further supported through additional guidance received from USEPA staff. The following sections of this document describe how USEPA's requirements have been met.

3.0 $PM_{2.5}$ Monitoring

Before the Illinois portion of the St. Louis nonattainment area can be redesignated, Illinois EPA must show that the area is attaining the 1997 annual $PM_{2.5}$ NAAQS via a demonstration that the three-year annual arithmetic mean $PM_{2.5}$ concentration at all monitors in the area is less than or equal to 15.0 $\mu g/m^3$. Monitoring data collection and quality assurance must be in accordance with 40 CFR 58.10, and the data must be recorded and publicly available in the USEPA AQS database. Lastly, Illinois must commit to continue to operate an appropriate monitoring network to verify maintenance of the attainment status, once the area has been redesignated. The following subsections identify how each of these requirements has been met and will continue to be met.

3.1 Monitored Design Values

Federal procedures found in Appendix N to 40 CFR Part 50 (Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$) provide the basis for determining attainment of the 1997 annual $PM_{2.5}$ NAAQS. For an individual monitor, three years of valid annual means are required to produce a valid annual $PM_{2.5}$ design value. For a monitor to meet data completeness requirements, at least 75 percent of the scheduled sampling days for each quarter must have valid data. Within the period 2007-2009 there were 14 sites that monitored $PM_{2.5}$ within the St. Louis nonattainment area, but only a subset of this total yielded valid design values. Certain sites did not begin sampling until 2009. Other sites did not represent regional air quality locations appropriate for characterizing annual $PM_{2.5}$ levels. St. Louis nonattainment area $PM_{2.5}$ monitoring sites during years 2007-2009 are shown in Figure 1.

For comparison with the NAAQS, three-year design values were calculated from annual average values in each year for the periods 2007-2009 and 2015-2017. Tables 1 and 2 present summaries of the annual average concentrations and design values of the air monitoring data gathered in the bi-state nonattainment area. There were no violations of the annual $PM_{2.5}$ standard during either of these periods, thus demonstrating that the area attained the 1997 annual $PM_{2.5}$ NAAQS.

Table 1: $PM_{2.5}$ Annual Average Monitoring Data (2007-2009)

State	City/County	Monitoring Site	2007 ($\mu g/m^3$)	2008 ($\mu g/m^3$)	2009 ($\mu g/m^3$)	Design Value ($\mu g/m^3$)
Illinois	Madison	Alton	14.9	12.5	10.1	12.5
Illinois	Madison	Wood River	14.2	12.2	11.0	12.5
Illinois	Madison	Granite City	15.1	15.7	11.3	14.1
Illinois	Randolph	Houston	14.2	10.4	9.7	11.4
Illinois	St. Clair	East St. Louis	15.6	12.5	11.7	13.3
Illinois	St. Clair	Swansea	13.3	12.6	11.7	12.5
Missouri	St. Louis City	Blair Street	13.9	12.7	11.5	12.7
Missouri	St. Louis City	South Broadway	14.0	12.5	11.9	12.8
Missouri	St. Louis County	Clayton[a]	13.1	12.0	11.3	12.1
Missouri	St. Louis County	Ladue[b]	14.0	12.5	11.9	12.8
Missouri	Jefferson	Arnold West	---	11.4	10.5	10.9

[a]Sampling discontinued
[b]FEM-TEOMS: Continuous sampler (sampling began in 2009)

Table 2: $PM_{2.5}$ Annual Average Monitoring Data (2015-2017)

State	City/County	Monitoring Site	2015 ($\mu g/m^3$)	2016 ($\mu g/m^3$)	2017 ($\mu g/m^3$)	Design Value ($\mu g/m^3$)
Illinois	Madison	Alton	9.0	8.8	8.7	8.8
Illinois	Madison	Wood River	9.1	8.7	8.3	8.7
Illinois	Madison	Granite City	10.4	9.1	9.6	9.7
Illinois	Randolph	Houston	7.9	8.0	9.6[a]	8.5
Illinois	St. Clair	East St. Louis	10.7	10.0	8.8	9.8
Missouri	St. Louis City	Blair Street	10.4	8.5	7.9	8.9
Missouri	St. Louis City	South Broadway	11.1	8.1	7.8	9.0
Missouri	St. Louis City	Forest Park	9.2	8.7	8.3	8.7
Missouri	St. Louis County	Ladue	10.3	8.7	9.4	9.5
Missouri	Jefferson	Arnold West	11.6	8.3	8.2	9.3

[a]Incomplete Data Capture

3.2 Quality Assurance

The Illinois ambient air monitoring data used in this demonstration has been quality assured in accordance with 40 CFR Part 58.10 and the Illinois EPA's Quality Assurance Plan. The Quality Assurance Plan outlines standard operating procedures for operating the monitoring network and validating the data. Missouri DNR has a similar quality assurance system. The Illinois EPA and Missouri DNR have recorded the air monitoring data in USEPA's AQS database, which is available to the public.

3.3 Continued Monitoring

Illinois commits to continue monitoring $PM_{2.5}$ levels in the St. Louis area in accordance with current and future USEPA-approved annual monitoring plans, as required to ensure maintenance of the $PM_{2.5}$ NAAQS. Illinois EPA will continue to monitor at the Illinois sites indicated in Table 2; however, if it becomes necessary to change a site, Illinois EPA will work with USEPA to ensure the adequacy of the monitoring network in meeting the requirements and objectives of 40 CFR 58. Illinois will continue to quality assure the ambient air monitoring data and to submit it into AQS in a timely manner in accordance with federal guidelines.

4.0 Emission Inventories/Demonstration of Maintenance

The redesignation requirement listed under CAA Section 107(d)(3)(E)(iii) states that the Administrator must determine that the improvement in air quality between the year that violations occurred and the year that attainment was achieved is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan and applicable federal air pollutant control regulations and other permanent and enforceable reductions. The redesignation request, therefore, should include an evaluation of the improvement in air quality for that period. It should also include a demonstration that expected emissions for the ten-year period following redesignation will be lower than the attainment year emission levels to ensure that future emissions in the area are sufficient to maintain the $PM_{2.5}$ NAAQS. The Illinois EPA commits to providing future updates of the inventory to enable tracking of emissions levels during the 10-year maintenance period and to support the maintenance demonstration.

4.1 Base, Attainment, and Maintenance Year Inventories

In accordance with the redesignation guidance document, the Illinois EPA is providing an inventory for "the year that was used to determine the design value for designation and classification" (2002), hereinafter referred to as the nonattainment year inventory. Also provided are inventories for 2008, 2025, and 2030. Year 2008 is the midyear of the three-year monitoring period (2007-2009) which yielded a design value demonstrating initial attainment with the NAAQS and resulted in USEPA's Clean Data Determination (May 23, 2011). Year 2025 is the midpoint of the maintenance period. Year 2030 is the initial "out year" period (10 years) for

demonstrating maintenance of the NAAQS and accounts for sector growth and any expected emission controls to be implemented during the period.

Illinois EPA prepared a comprehensive emissions inventory of its portion of the St. Louis $PM_{2.5}$ nonattainment area, including point, area, and on-road and off-road mobile sources for primary $PM_{2.5}$ as well as precursors of $PM_{2.5}$ (i.e., ammonia, NOx, SO_2, and VOM) for the base year of 2008. A summary of these results can be found in Table 3, below. Emissions for the Missouri portion of the area were provided by the Missouri DNR. This inventory is based on actual activity levels.

Table 3: Base Year Emissions for 2008 (tons/year)

Category	State	NH3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	208.31	16,608.41	2,438.05	49,895.15	4,270.41
	Missouri	1,308.64	31,103.26	3,493.39	201,700.73	5,067.89
	Total	1,516.95	47,711.67	5,931.44	251,595.88	9,338.30
Area	Illinois	3,354.13	1,638.36	4,749.40	246.67	7,796.35
	Missouri	3,514.98	4,382.94	14,033.64	11,510.48	38,215.34
	Total	6,869.11	6,021.30	18,783.04	11,757.15	46,011.69
On-road	Illinois	304.71	17,965.82	524.49	60.26	6,741.77
	Missouri	2,205.53	37,396.32	669.89	356.15	20,422.66
	Total	2,510.24	55,362.14	1,194.38	362.41	27,164.43
Off-road	Illinois	6.04	8,509.49	425.04	355.25	2,944.51
	Missouri	15.68	20,722.57	1,199.82	544.30	11,545.53
	Total	21.72	29,232.06	1,624.86	899.55	14,490.04
Totals	Illinois	3,873.19	44,722.08	8,136.98	50,557.33	21,753.04
	Missouri	7,044.83	93,605.09	19,396.74	214,111.66	75,251.42
	Overall	10,918.02	138,327.17	27,533.72	264,668.99	97,004.46

Point source information was compiled from the reporting year 2008 Annual Emissions Reports submitted to the Illinois EPA by emissions sources. Area source emissions were calculated using the most recently available methodologies and emissions factors from USEPA along with activity data (typically population, employment, fuel use, etc.) specific to 2008. More detail can be found in the document Illinois PM and Haze Emission Inventory for 2008 (AQPSTR10-06).

The original on-road mobile source inventory for 2008 was calculated using the MOBILE6.2 model. This model has been replaced by the MOVES model with version 2014a being the most current. With the required use of the MOVES model, the 2008 on-road inventory needed to be recalculated. The most recent inventory of on-road mobile sources calculated using MOVES was for 2014. Illinois EPA worked with the Illinois Department of Transportation (IDOT) and the Secretary of State to obtain appropriate registration data and VMT. MOVES inputs for 2008 were developed using the actual growth in VMT from 2008 to 2014 as reported by IDOT.

USEPA's NONROAD model was originally used to calculate emissions for off-road mobile sources. As with on-road emissions, Illinois EPA used the most recent version of MOVES to calculate off-road emissions for 2008. No modifications to data were made for the calculation of

emissions and all defaults provided by MOVES were used. The MOVES model does not include off-road emissions from aircraft, commercial marine vessels, and locomotives. Those emissions were calculated as described in the document Illinois PM and Haze Emission Inventory for 2008 (AQPSTR10-06).

4.2 Air Quality Improvements and Emissions Controls

The bi-state St. Louis area was designated as nonattainment of the 1997 $PM_{2.5}$ NAAQS in 2005. Since that time, permanent and enforceable reductions of primary $PM_{2.5}$ and secondary $PM_{2.5}$ precursor emissions have contributed to improvements in $PM_{2.5}$ air quality and to the attainment of the $PM_{2.5}$ NAAQS. Some of these emissions reductions were due to the application of tighter federal emissions standards on motor vehicles and fuels, and some due to the requirements of the federal NOx SIP Call, yet there have been numerous other federal rulemakings which in aggregate have impacted $PM_{2.5}$ primary and precursor emissions from a broad spectrum of emission sectors. Table 4 provides the inventory for the nonattainment year of 2002.

Table 4: Nonattainment Year Emissions for 2002 (tons/year)

Category	State	NH3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	44.19	34,453.30	2,313.93	54,541.89	5,094.48
	Missouri	1,315.75	44,198.46	4,607.23	156,999.31	11,637.86
	Total	1,359.94	78,651.76	6,921.16	211,541.20	16,732.34
Area	Illinois	3,787.15	3,606.09	7,918.92	387.85	24,686.92
	Missouri	3,968.07	9,929.23	14,833.21	17,231.89	45,385.16
	Total	7,755.22	13,535.32	22,752.13	17,619.74	70,072.08
On-road	Illinois	583.18	16,389.90	325.17	616.07	8,075.27
	Missouri	2,383.29	68,899.33	1,301.68	1,809.06	39,253.06
	Total	2,966.47	85,289.23	1,626.85	2,425.13	47,328.33
Off-road	Illinois	4.13	7,411.29	392.58	394.28	2,841.02
	Missouri	9.84	27,437.15	1,586.66	2,075.31	15,507.91
	Total	13.97	38,848.44	1,979.24	2,469.59	18,348.93
Totals	Illinois	4,418.65	61,860.58	10,950.60	55,940.09	40,697.69
	Missouri	7,676.96	150,464.17	22,328.78	178,115.57	111,783.99
	Overall	12,095.61	212,324.75	33,279.38	234,055.66	152,481.68

Comparing the 2002 inventory to that for 2008 indicates significant changes in both total direct $PM_{2.5}$ emissions and $PM_{2.5}$ precursors in the St. Louis area. A summary of the increases and decreases in primary $PM_{2.5}$ and $PM_{2.5}$ precursors between 2002 and 2008 are provided in Table 5.

Table 5: Difference Between 2002 and 2008 Emissions (tons/year)

Category	State	NH3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	164.12	-17,844.89	124.12	-4,646.74	-824.07
	Missouri	-7.11	-13,095.20	-1,113.84	44,701.42	-6,569.97
	Total	157.01	-30,940.09	-989.72	40,054.68	-7,394.04
Area	Illinois	-433.02	-1,967.73	-3,169.52	-141.18	-16,890.60
	Missouri	-453.09	-5,546.29	-799.57	-5,721.41	-7,169.82
	Total	-886.11	-7,514.02	-3,969.09	-5,862.59	-24,060.40
On-road	Illinois	-278.47	-1,575.92	199.32	-555.81	-1,333.50
	Missouri	-177.76	-31,503.01	-631.79	-1,452.91	-18,830.40
	Total	-456.23	-29,927.09	-432.47	-2,062.72	-20,163.90
Off-road	Illinois	1.91	1,098.20	32.46	-39.03	103.49
	Missouri	5.84	-6,714.58	-386.84	-1,531.01	-3,962.38
	Total	7.75	-9,616.38	-354.38	-1,570.04	-3,858.89
Totals	Illinois	-545.46	-17,138.50	-2,813.62	-5,382.76	-18,944.70
	Missouri	-632.13	-56,859.08	-2,932.04	35,996.09	-36,532.60
	Overall	-1,177.59	-73,997.58	-5,745.66	30,613.33	-55,477.20

Note: Negative value = decrease in emissions from 2002 to 2008; Positive value = increase in emissions from 2002 to 2008.

On the Illinois side, emissions of ammonia decreased by 545 tons/year, NOx emissions decreased by 17,138 tons/year, direct $PM_{2.5}$ decreased by 2,814 tons/year, SO_2 decreased by 5,383 tons/year, and VOM decreased by 18,945 tons/year.

On the Missouri side of the nonattainment area, emissions of ammonia decreased by 632 tons/year, NOx emissions decreased by 56,859 tons/year, direct $PM_{2.5}$ decreased by 2,932 tons/year, VOM emissions decreased by 36,533 tons/year, and SO_2 emissions increased by 35,996 tons/year. Missouri DNR has indicated that part of the SO_2 emissions increase is due to an emission factor change resulting from a stack test analysis conducted at the Doe Run Primary Lead Smelter in Herculaneum, Missouri. An electrical power production increase accounts for the remainder of the SO_2 2002 to 2008 emissions increase. Despite these increases, the overall reduction in direct $PM_{2.5}$ and precursor emissions has resulted in lower $PM_{2.5}$ concentrations across the bi-state nonattainment area. The reductions in NH_3, NOx, direct $PM_{2.5}$, and VOM emissions have contributed to the improved $PM_{2.5}$ concentrations monitored in the St. Louis nonattainment area. These emission reductions in direct $PM_{2.5}$ emissions and secondary $PM_{2.5}$ precursor emissions, as well as corresponding reductions in upwind areas in Illinois, Missouri, and other nearby states resulted in a substantial improvement in $PM_{2.5}$ air quality in the St. Louis area, ultimately resulting in attainment of the 1997 $PM_{2.5}$ NAAQS.

Table 6 identifies the calendar year 2017 estimated emissions from the bi-state area from Table 5 of the Federal Register notice for proposed approval of Missouri DNR's redesignation request (Federal Register Volume 83, No. 4, Friday, January 5, 2018, Page 647).

Table 6: Emission Inventory for 2017 (tons/year)

Category	State	NH3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	221.12	11,891.31	2,601.95	20,221.18	4,962.34
	Missouri	1,308.64	31,320.70	3,692.74	121,739.06	6,363.13
	Total	1,529.76	43,212.01	6,294.69	141,960.24	11,325.47
Area	Illinois	3,364.32	1,694.82	4,706.63	258.36	8,607.70
	Missouri	3,514.98	4,446.97	14,165.78	11,534.82	44,057.17
	Total	6,879.30	6,141.79	18,872.41	11,793.18	52,664.87
On-road	Illinois	186.79	5,623.42	231.68	49.31	2,364.85
	Missouri	722.47	22,904.99	913.15	191.12	10,867.41
	Total	909.26	28,528.41	1,144.83	240.43	13,232.26
Off-road	Illinois	3.46	8,673.75	370.28	390.79	2,303.43
	Missouri	15.75	10,505.88	787.35	193.55	7,398.02
	Total	19.21	19,179.63	1,157.63	584.34	9,701.45
Totals	Illinois	3,775.69	27,883.30	7,910.54	20,919.64	18,238.32
	Missouri	5,561.84	69,178.54	19,559.02	133,658.55	68,685.73
	Overall	9,337.53	97,061.84	27,469.56	154,578.19	86,924.05

4.3 Emissions Projections

A Maintenance Plan must contain a demonstration that the levels of emissions projected for the 10-year period following redesignation are sufficient to maintain the NAAQS. Accordingly, Illinois EPA has projected ammonia, NOx, $PM_{2.5}$, SO_2, and VOM for the St. Louis area for 2030, as well as for the interim year of 2025. Emissions for these projection years are compared to emissions levels in 2008 to determine if emissions are sufficient to maintain the NAAQS. Point and area source emissions were grown using USEPA's EGAS (version 5.0) program. The work on growing the St. Louis area inventory began many years ago and was conducted at the same time as the compilation of the future year inventory for the Chicago PM nonattainment area. To maintain consistency between the two inventories, the EGAS model continued to be used for growth of the point and area source portions of the St. Louis area inventory. The recession of 2008-2009 is certainly not included in the EGAS model. Due to that fact, Illinois EPA believes that continuing to use the already calculated future year inventory using EGAS will be more conservative than using growth factors from the NODA.

On-road emissions were estimated using MOVES2014a with a growth factor of 1.2% per year from 2014. Off-road emissions were estimated using the nonroad portion of the MOVES2014a model.

Nonattainment areas spanning multiple states and achieving attainment at approximately the same time will usually result in the states submitting their respective redesignation requests at the same time. The maintenance plan included in the request must have an inventory that projects emissions at least ten years into the future from approval of the redesignation. States typically work together to match timeframes and supply emission inventory data to each other. However, for the St. Louis (IL-MO) $PM_{2.5}$ nonattainment area, Illinois EPA was not able to submit a

redesignation request on the same schedule as Missouri DNR due to problems with the laboratory analyzing the collected monitoring data, which prevented Illinois from certifying the data. This resulted in multiple years of data being deemed unusable. Illinois EPA then needed to collect an additional three years of data to demonstrate monitored attainment. Since Missouri DNR's redesignation request was received much earlier than Illinois EPA's, their maintenance inventory ended in 2025.

Illinois EPA's maintenance inventory has been projected to 2030. Ideally, this redesignation request would include 2030 emissions calculated by Missouri DNR. The redesignation request from Missouri DNR was submitted longer ago, so rather than have Missouri do the additional work of calculating emissions for 2030, USEPA Region 5 agreed with Illinois that it would be acceptable to use the same emission rates for 2030 that Missouri DNR calculated for 2025. This is due to the fact that there is a downward trend in emissions within both states, which is expected to continue. Therefore, using the emissions from 2025 as emissions for 2030 is a more conservative approach.

Tables 7 and 8 identify the projected emissions for the bi-state area for 2025 and 2030.

Table 7: Projected Emissions for 2025 (tons/year)

Category	State	NH_3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	254.91	13,762.60	2,219.54	44,700.05	5,747.23
	Missouri	1,308.64	32,263.48	4,403.28	122,643.13	7,809.01
	Total	1,563.55	46,026.08	6,622.82	167,343.18	13,556.24
Area	Illinois	3,374.18	1,735.21	4,668.15	268.04	9,249.75
	Missouri	3,514.98	4,531.02	14,314.86	11,606.89	49,458.63
	Total	6,889.16	6,266.23	18,983.01	11,874.93	58,708.38
On-road	Illinois	178.97	3,849.45	119.31	52.83	2,042.78
	Missouri	691.88	16,568.44	533.34	189.22	8,035.80
	Total	870.85	20,417.89	652.65	242.05	10,078.58
Off-road	Illinois	8.16	8,687.02	303.26	400.33	1,585.08
	Missouri	17.63	8,895.81	640.68	219.90	7,178.29
	Total	25.79	17582.83	943.94	620.23	8763.37
Totals	Illinois	3,816.22	28,034.28	7,310.27	45,421.25	18,624.85
	Missouri	5,533.13	62,258.75	19,892.16	134,659.14	72,481.73
	Overall	9,349.35	90,293.03	27,202.43	180,080.39	91,106.58

Table 8: Projected Emissions for 2030 (tons/year)

Category	State	NH_3	NOx	$PM_{2.5}$	SO_2	VOM
Point	Illinois	270.38	14,519.27	2,350.90	47,652.59	6,071.31
	Missouri	1,308.64	32,263.48	4,403.28	122,643.13	7,809.01
	Total	1,579.02	46,782.75	6,754.18	170,295.72	13,880.32
Area	Illinois	3,381.35	1,766.40	4,656.69	275.09	9,676.73
	Missouri	3,514.98	4,531.02	14,314.86	11,606.89	49,458.63
	Total	6,896.33	6,297.42	18,971.55	11,881.98	59,135.36
On-road	Illinois	187.59	2,984.38	104.24	51.76	1,402.96
	Missouri	691.88	16,568.44	533.34	189.22	8,035.80
	Total	879.47	19,552.82	637.58	240.98	9,438.76
Off-road	Illinois	8.94	9,222.09	304.41	432.68	1,605.73
	Missouri	17.63	8,895.81	640.68	219.90	7,178.29
	Total	26.57	18,117.90	945.09	652.58	8,784.02
Totals	Illinois	3,848.27	28,492.14	7,416.24	48,412.12	18,756.74
	Missouri	5,533.13	62,258.75	19,892.16	134,659.14	72,481.73
	Overall	9,381.40	90,750.89	27,308.40	183,071.26	91,238.47

4.4 Demonstration of Maintenance

Among the required elements of a maintenance plan are a comprehensive attainment year emissions inventory and a projected emissions inventory at least ten years into the future following the area's redesignation. The latter demonstrating that $PM_{2.5}$ and precursor emissions, the result of permanent and enforceable emission controls, will remain below the levels of the attainment year emissions inventory for the maintenance period and thereby preserve the NAAQS. This submittal includes an emissions inventory for the interim year of 2025 to support the 10-year period demonstration. The Missouri portion of this 2025 inventory represents a previously-developed 10-year maintenance plan period inventory. The interim inventory provides assurance of compliance with the 1997 annual $PM_{2.5}$ NAAQS during the maintenance period. Emissions for the 2025 and 2030 projection years are compared to emissions levels for the base year, 2008, and the projected year emissions levels must remain below the base year levels throughout the maintenance period. A follow-up analysis will be conducted by Illinois EPA comparing the Illinois NAA actual 2025 emissions to the projected emissions to ensure the area keeps pace with the reductions expected throughout the maintenance period. Each of the inventories include point, area, on-road mobile, and off-road mobile source categories. As noted previously, a detailed 2008 Illinois annual emissions inventory is provided in Attachment A.

Regulations that have become effective since 2008, and expected future regulations, will continue to help control $PM_{2.5}$ and precursor emissions in the St. Louis area. Prevention of Significant Deterioration (PSD) requirements for $PM_{2.5}$ will apply to new major source construction and to significant modifications at existing sources. Future transportation plans will be required to conform to the conformity plan budgets. These measures provide assurance that the area will continue to maintain compliance with the 1997 annual $PM_{2.5}$ NAAQS.

Table 9 provides a summary of the reductions in emissions for 2025 and 2030 from the base year of 2008.

Table 9: Comparison of 2008, 2025, and 2030 Emissions (tons/year)

Pollutant	State	2008	2025	2030	Difference 2008-2025	Difference 2008-2030
NH3	Illinois	3,873.19	3,816.22	3,848.27	-56.97	-24.92
	Missouri	7,044.83	5,533.13	5,533.13	-1,511.70	-1,511.70
	Total	10,918.02	9,349.35	9,381.40	-1,568.67	-1,536.62
NOx	Illinois	44,722.08	28,034.28	28,492.14	-16,687.80	-16,229.94
	Missouri	93,605.09	62,258.75	62,258.75	-31,346.34	-31,346.34
	Total	138,327.17	90,293.03	90,750.89	-48,034.14	-47,576.28
$PM_{2.5}$	Illinois	8,136.98	7,310.27	7,416.24	-826.71	-720.74
	Missouri	19,396.74	19,892.16	19,892.16	495.42	495.42
	Total	27,533.72	27,202.43	27,308.40	-331.29	-225.32
SO_2	Illinois	50,557.33	45,421.25	48,412.12	-5,136.08	-2,145.21
	Missouri	214,111.66	134,659.14	134,659.14	-79,452.52	-79,452.52
	Total	264,668.99	180,080.39	183,071.26	-84,588.60	-81,597.73
VOM	Illinois	21,753.04	18,624.85	18,756.74	-3,128.19	-2,996.30
	Missouri	75,251.42	72,481.73	72,481.73	-2,769.69	-2,769.69
	Total	97,004.46	91,106.58	91,238.47	-5,897.88	-5,765.99

The maintenance demonstration is based on the comparison of the emission levels in 2008 with those projected for the future year of the plan. Because the area attained the standard in 2008, this is expected to be a level of emissions that can maintain the level of the standard. Because the 2030 emissions levels are expected to be less than 2008 actual levels, this results in a safety margin. The safety margin provides added assurance that emissions will remain below the levels necessary for demonstrating maintenance of the NAAQS.

When considering all emission sectors combined, $PM_{2.5}$ and precursor emissions are projected to decrease from 2008-2030 due to permanent and enforceable control requirements. In particular, combined mobile source emissions from Illinois and Missouri sides of the NAA are expected to decrease significantly from 2008 to 2030. Similarly, point source SO_2 emissions are expected to decrease significantly on both sides of the nonattainment area based on control requirements for sources located in the nonattainment area. This aggregate reduction in emissions across sectors satisfies the maintenance demonstration requirement of this Maintenance Plan.

4.5 Provisions for Future Updates

As required by Section 175A(b) of the CAA, Illinois commits to submit to the USEPA an additional revision to the $PM_{2.5}$ SIP eight years after redesignation. The revision will contain Illinois' plan for maintaining the $PM_{2.5}$ standard for 10 years beyond the first 10-year period after redesignation.

5.0 Control Measures and Regulations

This section provides specific information on the control measures implemented in the bi-state St. Louis nonattainment area. These include CAA requirements and other state and federal measures. These control measures have been fully promulgated and will provide emissions reductions in future years. Illinois EPA commits to keep these measures in effect after redesignation or to maintain equivalent emissions levels using alternate measures. Illinois' SIP contains acceptable provisions to provide for preconstruction review of new emissions sources. After redesignation to attainment, PSD requirements will apply to the construction of new major sources and to significant modifications of existing sources. Illinois further commits to continue to require that all future regional transportation plans for the St. Louis area conform to the SIP.

5.1 Background

Both preceding and following the 2005 St. Louis nonattainment area designation, permanent and enforceable reductions of primary $PM_{2.5}$ and precursors have contributed to improvements in air quality and to attainment of the $PM_{2.5}$ NAAQS. These reductions have come about through federal rulemakings, consent decrees, and state rulemakings/permitting actions. Among the federal measures are the NOx SIP Call, Tier 2 vehicle standards, Tier 4 Off-Road Mobile Engine Standards, Reformulated Gasoline, Clean Air Interstate Rule (CAIR), Cross-State Air Pollution Rule (CSAPR), and Heavy-Duty Diesel Engine Standards and Low-Sulfur Diesel. The NOx SIP Call, CAIR, and CSAPR required states to reduce emissions consistent with the interstate transport provisions of CAA Section 110(a)(2)(D)(i)(I). These programs significantly reduced annual and ozone season NOx emissions in the western two-thirds of Missouri and thereby reduced the transport of $PM_{2.5}$ precursor NOx emissions into the St. Louis nonattainment area. Illinois had also adopted multi-pollutant rules – the Multi-Pollutant Standard (MPS) and Combined Pollutant Standard (CPS) – to control emissions of NOx and SO_2 from electrical generating facilities. These rules resulted in permanent and enforceable emission reductions in the Illinois portion of the bi-state nonattainment area.

Federal and state regulations for mobile sources have been phased in since 2002 and have reduced $PM_{2.5}$ and precursor pollutants from on-road and off-road mobile sources. The phasing out of older, higher-polluting on-road vehicles and off-road engines and the phasing in of federal mobile source standards have contributed to a decrease of 448 tons of NH_3, 39,543 tons of NOx, 787 tons of direct $PM_{2.5}$, 3,633 tons of SO_2, and 24,023 tons of VOM within the bi-state nonattainment area from 2002-2008. In addition to these programs, Illinois has operated a vehicle inspection/maintenance program in the Metro-East St. Louis area. Overall, the mobile source control measures have resulted in the most significant amounts of $PM_{2.5}$ and precursor emission reductions.

Air quality in the Illinois portion of the nonattainment area has benefited from implementation of State point source NOx controls and other emission controls targeting ozone precursors. Federally-initiated litigation resulting in emission-reducing consent decrees with local industry include the *ConocoPhillips Global Refinery Settlement* (filed January 27, 2005, U.S. District Court for the Southern district in Texas), which provided for installation (no later than December 31, 2009) of low-NOx burners and ultra-low NOx burners on combustion units at its "Distilling

West" operations (Roxana, IL, refinery), as well as SO_2, particulate matter, and other NOx reductions from process operations. A settlement reached with Dynegy Midwest Generation (*USA v. IL Power Co., et.al. 3:99-cv-833 Consent Decree, March 2005, U.S. District Court for the Southern District of Illinois*) included the requirements to "commence operation of the SCRs installed at Baldwin Unit 1, Unit 2… so as to achieve and maintain a 30-day rolling average emission rate from each such unit of not greater than 0.100 lb/mmBtu NOx" and "maintain a 30-day rolling average emission rate of not greater than 0.120 lb/mmBtu NOx at Baldwin Unit 3." Within this same timeframe, the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Integrated Iron and Steel Manufacturing Facilities was amended on July 13, 2006, affecting emission limits from the blast furnaces and BOF shop at the U.S. Steel facility in Granite City, Illinois. The control measures and emission reductions resulting from this federal rulemaking and consent agreements continue to be permanent and enforceable.

5.2 Control Measures

A variety of control measures are in place that reduce emissions of direct $PM_{2.5}$, NOx, SO_2, NH_3, and VOM, and have contributed to the attainment of the annual fine particle standard. Emissions reduction measures contributing to demonstrating attainment of the $PM_{2.5}$ standard are as follows:

- NOx SIP Call/CAIR/CSAPR
- NSPS, NESHAP and MACT Standards
- Utility MATS Rule
- VOM Solvent Categories: Aerosol Coatings, Architectural and Industrial Maintenance (AIM) Coatings, Consumer Solvents
- Vehicle Inspection & Maintenance Program
- Reformulated Gasoline
- Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements
- On-Highway Heavy-Duty Engine and Vehicle Standards and Highway Diesel Fuel Sulfur Control Requirements
- Federal Emissions Standards for Off-Road Equipment (e.g., Nonroad Diesel Engine Rule, Evaporative Large Spark Ignition and Recreational Vehicle Standards) incorporated into NONROAD Model
- Tier 4 Nonroad Diesel Engine Standards and Diesel Fuel Sulfur Content Restrictions
- Marine Compression-Ignition Engine Standards and Locomotive Engine Standards
- Consent Decrees (WRB Refining and Dynegy)

Illinois will maintain all the applicable control measures listed in this Section to ensure maintenance of the annual $PM_{2.5}$ NAAQS. Any revisions to the control measures included as part of the Maintenance Plan will be submitted as a SIP revision to USEPA for approval and will be accompanied by a showing that such changes will not interfere with maintenance of the NAAQS.

Consent orders involving a steel manufacturing facility (U.S. Steel – Granite City Works) and a coke-manufacturing facility (Gateway Energy & Coke Company) in Madison County have required permanent and enforceable emission limits or emission reduction projects. These

consent orders represent additional control measures which are beyond what has been considered in the maintenance demonstration. These measures do, however, provide additional assurance that the bi-state NAA will continue to comply with the 1997 annual $PM_{2.5}$ NAAQS. In March 2013, U.S. Steel received a construction permit for the installation of a baghouse on the basic oxygen process furnace at the facility. The permit includes specific emission limitations that apply to the operation of the baghouse. Since USEPA has published an attainment finding for the bi-state St. Louis nonattainment area for the 1997 $PM_{2.5}$ standard, the requirements for Illinois to submit an attainment demonstration, Reasonably Available Control Measures (RACM), Reasonable Further Progress (RFP), contingency measures, and any other planning SIP items related to attainment are suspended as long as the area continues to attain the 1997 $PM_{2.5}$ NAAQS.

The Illinois EPA has the necessary resources to enforce any violations of its rules or permit provisions. After redesignation, it intends to continue enforcing all rules that relate to the emissions of primary $PM_{2.5}$ and precursors to secondary $PM_{2.5}$ in the St. Louis nonattainment area.

5.3 Controls to Remain in Effect

Illinois adopted measures as required by the Clean Air Act, Part D, Subpart 4, "Additional Provisions for Particulate Matter Nonattainment Areas" (42 USC 7513). Requirements applying to Particulate Matter ("PM") emission sources located in Illinois are found in 35 Ill. Adm. Code Part 212 (Visible and Particulate Matter Emissions). USEPA fully approved these revisions as part of Illinois' State Implementation Plan on July 13, 1995. Illinois' rules controlling PM emissions contained in 35 Ill. Adm. Code Part 212 have been fully implemented. Illinois has the legal authority to implement and enforce all measures adopted as part of the $PM_{2.5}$ attainment plan. The Illinois EPA conducts periodic inspections of all major sources, as well as of many minor sources. If inspections indicate a need for enforcement, the Illinois EPA is obligated to address such noncompliance consistent with the requirements of the Illinois Environmental Protection Act and implementing regulations. Illinois is required to submit to USEPA for approval as a SIP revision any changes to its rules, or emission limits applicable to PM sources in 35 Ill. Adm. Code Part 212. Such revisions will include, where appropriate, a demonstration that such changes will not interfere with maintenance of the NAAQS. After redesignation, Illinois commits to continue enforcing all rules that relate to the emission of $PM_{2.5}$ in the Illinois portion of the St. Louis NAA.

5.4 Provisions for Permitting New or Modified Emissions Sources

Illinois has longstanding and fully-implemented programs for the review of new major sources and significant modifications of existing sources. Illinois' nonattainment area New Source Review permitting program for new and modified sources of particulate matter emissions (permitting requirements include major source emission thresholds, offset ratios, control requirements, etc.) applies to the area. The PSD program, which includes requirements for BACTon major new sources or significant modifications of existing sources, will be applicable in the Metro-East St. Louis area once the area has been redesignated to attainment.

6.0 Contingency Measures

Contingency measures, which are a required element of the maintenance plan (CAA Section 175(A)), are to be implemented if violations of the 1997 annual $PM_{2.5}$ NAAQS are measured after redesignation to attainment. These measures are intended to provide further emission reductions if needed, and they are to be adopted expeditiously once triggered. The maintenance plan must identify the measures that the state will consider and the triggers that determine when the contingency measures will be adopted. Illinois EPA's contingency plan for the Metro-East St. Louis NAA is described in Table 10.

The contingency plan provides for different levels of corrective responses if emissions in the NAA increase significantly above current attainment levels, if ambient $PM_{2.5}$ levels exceed the 1997 NAAQS in any year, or if ambient $PM_{2.5}$ levels violate the NAAQS over a three-year period. A Level I response would occur for the following: 1) the annual average $PM_{2.5}$ concentration for any year at any monitoring site in the Illinois portion of the bi-state St. Louis NAA exceeds 15 micrograms per cubic meter, or 2) if total $PM_{2.5}$, SO_2, NOx, NH_3, or VOM emissions increase more than 5% above the levels contained in the attainment year emissions inventory. If exceedances of the annual $PM_{2.5}$ NAAQS are observed in the Missouri portion of the bi-state St. Louis NAA, Illinois commits to work with the Missouri Department of Natural Resources to develop appropriate corrective measures. It should be noted that USEPA does not require a state to implement contingency measures when occasional exceedances are recorded. The Illinois EPA's voluntary commitment to initiate a Level I response is intended to prevent future violations of the NAAQS from ever occurring.

Table 10: Contingency Plan for the Illinois Portion of the NAA

Contingency Measure Trigger	Action to be Taken	List of Potential Contingency Measures
Level I Trigger • Highest monitored $PM_{2.5}$ concentration exceeding 15.0 $\mu g/m^3$ in any year at any monitoring station in the Metro-East maintenance area • The Metro-East maintenance area's total NH_3, NOx, $PM_{2.5}$, SO_2, or VOM emissions increase more than 5% above the levels included in the 2008 inventory	Illinois EPA will evaluate air quality or determine if adverse emissions trends are likely to continue. If so, Illinois EPA will determine what and where controls may be required, as well as level of emissions reductions needed to avoid a violation of the NAAQS. The study shall be completed within nine months. If necessary, control measures shall be adopted within 18 months of determination and implemented as expeditiously as practicable, taking into consideration the ease of implementation and the technical and economic feasibility of the selected measures.	• Facility-specific controls requiring reductions in NH_3, NOx, $PM_{2.5}$, SO_2, and/or VOM emissions. • Broader geographic applicability of existing measures.
Level II Trigger • A violation of the NAAQS at any monitoring station in the Metro-East maintenance area.	Illinois EPA will conduct a thorough analysis to determine appropriate measures to address the cause of the violation. Analysis shall be completed within six months. Selected measures shall be implemented within 18 months of a violation.	

Illinois commits to compiling $PM_{2.5}$, SO_2, NOx, NH_3, and VOM emissions inventories for the Metro-East St. Louis area every three years for the duration of the maintenance plan to facilitate the emissions trends analysis included in the contingency plan under Level I. The Illinois EPA will evaluate the causes of high $PM_{2.5}$ levels or the emissions trends and determine appropriate control measures needed to assure continued attainment of the annual $PM_{2.5}$ NAAQS. Under Level I, measures that could be implemented in a short time would be preferentially selected to be in place quickly after the Illinois EPA is aware that corrective measures have been triggered. Control measures selected under Level I will be adopted in most cases within 18 months after a determination is made, and implemented, generally, within 24 months of adoption by the IPCB.

A Level II response would be implemented in the event that a violation of the annual $PM_{2.5}$ NAAQS were to be measured at a monitoring site within the bi-state St. Louis maintenance area. In order to select appropriate corrective measures, the Illinois EPA will work with Missouri DNR to conduct a comprehensive study to determine the causes of the violation and the control measures necessary to mitigate the problem. The analysis will examine the following factors:

- The location and severity of the ambient $PM_{2.5}$ exceedances
- The weather patterns contributing to the elevated $PM_{2.5}$ levels
- Potential contributing emissions sources

- The geographic applicability of possible contingency measures
- Emissions trends, including timeliness of scheduled control measures implementation
- Current and recently identified control technologies
- Air quality contributions from outside the maintenance area

Contingency measures will be selected from those listed in Table 10 or from any other measure deemed appropriate and effective at the time the selection is made. It is expected that implementation of only a few of these measures would be necessary. The selection between measures will be based upon cost-effectiveness, emissions reduction potential, ease and timing of implementation, and other appropriate factors. Implementation of necessary controls in response to a Level II trigger will take place as expeditiously as possible, but in no event later than 18 months after the Illinois EPA makes a determination, based on quality-assured ambient data, that a violation of the NAAQS has occurred.

The contingency measures listed in Table 10 are expected to be evaluated in the event of a Level I or Level II trigger; however, federal actions that require control measures may also be taken into account when the analysis to determine the cause of a future violation occurs. These additional federal actions, while not actual contingency measures, may be evaluated in the event of a trigger to determine their anticipated effect on the levels of expected emissions from sources in the area in order to determine whether or not additional local control measures are necessary. Any future federal requirements that control direct $PM_{2.5}$ or $PM_{2.5}$ precursor emissions may be evaluated in the event of a future trigger.

Adoption of additional control measures is subject to necessary administrative and legal processes. The Illinois EPA will solicit input from all interested and affected persons in the area prior to selecting appropriate control measures. No contingency measure will be implemented without providing the opportunity for full public participation. This process will include publication of notices, an opportunity for public hearing, and other measures required by Illinois law.

As mentioned previously, the Illinois EPA commits to developing and submitting a second 10-year maintenance plan, within eight years after redesignation, as required by CAA Section 175(A). The maintenance plan revision will analyze and update the contingency plan to provide assurance that any potential future violations will be addressed through application of relevant contingency measures when triggered.

7.0 Transportation Conformity

This section describes the development of the Illinois portion of the St. Louis NAA motor vehicle emissions budgets associated with the $PM_{2.5}$ Maintenance Plan SIP. Annual motor vehicle emissions budgets are being proposed for the attainment year, 2008, and 2030, the final year of the initial maintenance period for direct motor vehicle $PM_{2.5}$ emissions and for the precursor pollutants NOx and VOM. These budgets were developed consistent with the motor vehicle activity assumptions and emissions control strategies incorporated into the $PM_{2.5}$ maintenance plan analysis.

Section 176(c)(4) of the Clean Air Act (CAA) Amendments of 1990 requires that transportation plans, programs, and projects which are funded or approved under Title 23 USC must be determined to conform with State or Federal air implementation plans. A motor vehicle emissions budget is that portion of the total allowable emissions allocated to highway and transit vehicle use that are defined in the SIP for a certain year. Section 93.101 of the rule defines a "control strategy [State] implementation plan revision" as a "plan which contains specific strategies for controlling the emissions and reducing ambient levels of pollutants in order to satisfy CAA requirements of reasonable further progress and attainment." In order to demonstrate conformity to the motor vehicle emissions budget, emissions from the implementation of a transportation plan or a transportation improvement program (TIP) must be less than or equal to the budget level (40 CFR §93.118(a)).

Transportation conformity is based on the submitted on-road motor vehicle emissions budgets after the USEPA determines that the budgets meet the adequacy criteria of the transportation conformity rule under §93.118(e). The motor vehicle emissions budgets in this submittal are adequate as each of the six criteria under §93.118(e) is satisfied. These six criteria are:

1. The submitted control strategy implementation plan revision or maintenance plan was endorsed by the Governor (or his or her designee) and was subject to a State public hearing.
2. Before the control strategy implementation plan or maintenance plan was submitted to USEPA, consultation among federal, State, and local agencies occurred: full implementation plan documentation was provided to USEPA; and USEPA's stated concerns, if any, were addressed;
3. The motor vehicle emissions budget(s) is clearly identified and precisely quantified;
4. The motor vehicle emissions budget(s), when considered together with all other emission sources, is consistent with all applicable requirements for reasonable further progress, attainment, or maintenance (whichever is relevant to the given implementation plan submission);
5. The motor vehicle emissions budget(s) is consistent with and clearly related to the emissions inventory and the control measures in the submitted control strategy implementation plan revision or maintenance plan, and

6. Revisions to previously submitted control strategy implementation plans explain and document any changes to previously submitted budgets and control measures, impacts on point and area source emissions; any changes to established safety margins; and reasons for the changes (including the basis for any changes related to emission factors or estimates of vehicle miles traveled).

This SIP and the associated motor vehicle emissions budgets have been developed by Illinois EPA, the designated air quality agency for the State of Illinois. Public notice for comment and the opportunity to request a public hearing on the proposed redesignation and associated motor vehicle emissions inventory was posted on the Illinois EPA's website on October 23, 2018. Comments on the proposed redesignation were accepted for 30 days after the public notice.

In compliance with criterion #2 above, the Tier 2 Conformity Consultation Team was kept apprised of the various iterations and issues with the proposed motor vehicle budget. The Consultation team includes representatives from the Federal Highway Administration, Federal Transit Authority, USEPA, East-West Gateway Council of Governments, IDOT, and the Illinois EPA. The expected final budget was presented at the Tier 2 meeting on October 30, 2018.

The motor vehicle emissions budgets proposed and described herein satisfy adequacy criterion #5. The effects of these controls are incorporated into the emissions estimates produced by the MOVES model. In response to adequacy criteria #4 and #6, the narrative of this document discusses the emissions estimates from other sectors and any changes in regulations. In response to adequacy criteria #3, a description of the inputs and assumptions incorporated into the development of the proposed motor vehicle emissions budgets follows:

Vehicle Miles Traveled: The year of data used for VMT was 2014 with the data coming from IDOT. Data regarding fleet mix and VMT were updated since the 2008 inventory. With 2008 data being different and having run a different model (MOBILE6), the Illinois EPA back-casted 2014 VMT to 2008 using the growth rate of 1.2% per year. The 2008 annual VMT total for Illinois' portion of the nonattainment area was approximately 5.9 billion miles. For future year emission estimates, VMT was grown to the target year using a compound growth rate of 1.2% per year. Applying this growth factor to the 2008 VMT level yields a future year annual VMT projection of 7.3 billion miles for 2030.

Meteorological Data: USEPA guidance for the use of the MOVES model requires the use of representative local temperature and absolute humidity data. Appropriate hourly temperature and humidity values were used to calculate emissions.

Motor Vehicle Emissions Controls: Beyond USEPA's federal motor vehicle control program emissions standards, the primary local motor vehicle emissions control programs that were in place in the St. Louis NAA in 2014 and are projected to still be required in 2030 are a vehicle I/M program and the required use of reformulated gasoline.

Inspection and Maintenance: The current Illinois I/M program, in effect since February 1, 2012, requires biennial On-Board Diagnostics II testing on all model year 1996 and newer light-duty gasoline vehicles (cars and light-duty trucks), and 2007 and newer heavy-duty gasoline

vehicles with a gross vehicle weight rating between 8,501 and 14,000 pounds, registered in the I/M testable area. Motorcycles and diesel vehicles are not subject to I/M. The program includes a four-year grace period for new vehicles. The post-2012 I/M program was established when the Illinois legislature amended the Illinois Vehicle Inspection law in 2001 and 2005 as follows:

- End dynamometer testing of vehicles
- Require an on-board diagnostic-based (OBD) program beginning in February 2007
- Remove the requirement for testing compliant pre-model year 1996 vehicles
- End the steady-state idle exhaust and evaporative system integrity (gas cap pressure) tests
- Exempt pre-2007 model year heavy duty vehicles with a Gross Vehicle Weight Rating (GVWR) between 8,501 and 14,000 pounds
- Exempt all heavy-duty vehicles with GVWR greater than 14,000
- Add a visual inspection test for vehicles that are equipped with OBD technology, but for which OBD testing is not possible due to the vehicle's design

The Metro-East St. Louis I/M program vehicle testing domain includes the urbanized areas in the St. Louis NAA. An "I/M Coverage" percentage was developed based on the amount of VMT from vehicles subject to the inspection program compared to total area VMT. The I/M Coverage percentage for the Metro-East NAA is 84%.

Fuels: The use of federal RFG has been required in the Metro-East St. Louis NAA since 2007 and the St. Louis, Missouri, area since 2001. The entire St. Louis NAA is classified as a "southern" area for purposes of motor fuel control programs, so southern grade RFG is required and assumed to be used in the Metro-East area. RFG was assumed to contain 10% ethanol. The MOVES model can account for other fuels such as E85, natural gas, methanol, etc., but for all practical purposes, the gallons of such alternative fuels and hence, the number of vehicles using them, is very small compared to the number of gasoline and diesel vehicles. Therefore, the use of other such fuels was not considered.

Gasoline Sulfur: The federal Tier 3 regulations require gasoline sulfur levels to average no greater than 30 ppm, with a maximum of 80 ppm beginning in 2007. There are no Illinois gasoline sulfur requirements. Therefore, the MOVES gasoline sulfur levels were used in the emissions modeling.

Diesel Sulfur: The federal Tier 2 regulations limit the level of sulfur in diesel fuel requiring on-highway diesel fuel to 15 ppm beginning in 2006. Therefore, the MOVES diesel sulfur levels were used in the emissions modeling.

Fuel Volatility: The volatility of summer RFG, measured as RVP, is not specifically regulated. However, a fuel's RVP is one of the primary characteristics controlled in order to meet the RFG performance standards. The MOVES model contains default levels for different seasons of the year based on fuel compliance testing. Therefore, the MOVES RVP levels were used in the emissions modeling.

Vehicle Registration Distribution: A Metro-East area-specific vehicle registration distribution profile based on 2014 data was developed by Illinois EPA's Division of Mobile Source Programs from vehicle age data for 2013 provided by the Illinois Secretary of State's Department of Motor Vehicles. The registration distribution is the fraction of vehicles of a given vehicle type and age in the fleet of vehicles of that type as a whole. Different vehicle types have different distributions. This profile is assumed to remain valid for 2030.

Source Type Population: This value represents the number of vehicles of each MOVES vehicle type in the fleet as a whole within the area under consideration. Accurate local source-type populations were derived from the 2013 data provided by the Secretary of State's Department of Motor Vehicles in conjunction with default distributions contained in MOVES.

VMT Temporal Fractions: This value is the VMT fraction of annual VMT by month of the year, of weekly VMT by day of the week, and daily VMT by hour of the day. The Illinois EPA used default values from MOVES. Temporal fractions vary by road type.

Speed Distribution: These values are the fractions of VMT on a given road type by given vehicle types in various speed ranges. Thus, on a typical urban arterial, a small fraction of the vehicles are traveling less than 10 miles per hour (mph) plus or minus 5 mph, more at 20 mph, more at 30 mph, most at 40 mph, less at 50 mph, and so on. These fractions differ by hour of the day. In more congested conditions during rush hours, the maximum fraction might be in the 30-mph range rather than the 40 mph range. MOVES uses speed distributions when aggregating emissions (or emission rates) for vehicles at different speeds. The Illinois EPA used the default speed distributions from MOVES.

Ramp Fraction: This value is the fraction of total VMT on limited-access highways, such as interstates, that is from on- and off-ramps to or from those highways. Driving on limited-access highways is more of less at uniform speed, but driving on ramps involves considerable acceleration and deceleration, which affects emissions. The default MOVES ramp fractions are 15% on rural interstates, 10% on urban interstates, and 2% on other freeways and expressways. Illinois EPA does not have actual or observed ramp fraction data.

Road Type Distribution: This value is the fraction of VMT on different road categories within the area under consideration. The Illinois EPA used VMT data by the Highway Performance Monitoring System functional class published by IDOT as the basis of its emission calculations. The road type distributions came from default MOVES values.

The emission rates produced by MOVES estimate that NOx, $PM_{2.5}$, and VOM emissions will be 2,984.38, 104.24, and 1,402.96 tons/year respectively. The transportation conformity regulations (40 CFR93.118(a)) allows the addition of a portion of a "safety margin" (the difference between the base year inventory and the future year inventory) to the motor vehicle emissions estimates. As year 2030 emission levels are projected to be substantially less than the attainment year 2008 emissions, a fraction of the safety margin, 20% (for NOx and VOM) and 25% (for $PM_{2.5}$), is being proposed to be added to the 2030 estimated motor vehicle emissions to establish the motor vehicle emissions budgets established in Table 11.

Table 11: Proposed Motor Vehicle Emissions Budgets (tons/year)

Pollutant	2008 Motor Vehicle Emission Budget (tons/year)	2030 Emissions (tons/year)	2030 Applied Safety Margin (tons/year)	2030 Motor Vehicle Emission Budget (tons/year)
NOx	17,965.82	2,984.38	2,996.29	5,980.67
$PM_{2.5}$	524.49	104.24	104.05	208.29
VOM	6,741.77	1,402.96	1,067.76	2,470.72

8.0 Public Participation

In accordance with Section 110(a)(2) of the CAA, Illinois is required to have a public comment period and provide the opportunity for a public hearing on the maintenance plan prior to adoption. Public participation in the SIP process is provided for as follows:

- Notice of availability of this document was posted on the Illinois EPA's website on October 23, 2018.
- If requested, a public hearing to receive comments on the St. Louis Maintenance Plan will be scheduled.

If a hearing is requested, copies of the transcript of the hearing, a summary of the comments received, and Illinois EPA's responses to those comments will be included as part of the final submittal to USEPA.

9.0 Conclusion

The bi-state St. Louis $PM_{2.5}$ nonattainment area has attained the 1997 annual $PM_{2.5}$ NAAQS and has complied with the applicable provisions of the 1990 Clean Air Act (as amended) required of particulate matter nonattainment areas. Illinois believes that the air quality improvements achieved in this area are due to permanent and enforceable control measures. Through this submittal, Illinois is formally requesting redesignation of the Illinois portion of the nonattainment area to attainment while simultaneously providing the maintenance plan required for redesignation. This submittal fully addresses the redesignation obligations under Section 107 of the CAA and the applicable maintenance plan requirements under Section 175A of the CAA.

The maintenance plan has been prepared in accordance with the requirements specified in USEPA's guidance document and with the recommendations of USEPA Region 5 staff. The maintenance plan provides for the continued attainment of the 1997 $PM_{2.5}$ NAAQS for a period of at least ten years after redesignation, while also providing adequate contingency measures for potential, additional emission reductions in the event of future violations in the area. Illinois has prepared comprehensive emissions inventories of $PM_{2.5}$ sources for 2016, 2025, and 2030 which demonstrate that expected emissions in the ten years following redesignation will remain at or below the 2016 attainment year levels. These inventories include anthropogenic emissions of

direct $PM_{2.5}$ and precursors (NH_3, NOx, SO_2, and VOM). The maintenance plan includes on-road motor vehicle emissions budgets for use in transportation conformity determinations to assure that any increases in emissions from this sector do not jeopardize continued attainment during the 10-year maintenance period. Illinois commits to continue to operate an appropriate monitoring network to verify maintenance of the attainment status once the area has been redesignated. The Illinois EPA and the Missouri Department of Natural Resources have the necessary legal authorities to implement and enforce SIP-approved control measures in their respective portions of the nonattainment area.